Synfuels Crash Program Viewed as Risky

Experts at Harvard, RFF prefer modest "informational" effort over trying to build major industry by 1990

Some independent energy experts who are far apart on other key policy issues seem pretty much of one mind in putting down as a bad idea President Carter's proposed crash program to develop, by 1990, an entirely new industry capable of producing synthetic fuels and other oil substitutes at the rate of 2½ million barrels per day (MBPD). This can be seen, for instance, in the views held by the authors of the recent report of the Harvard Business School energy project and by the authors of the report just issued by Resources for the Future (RFF), a respected private research organization based in Washington.

In most respects, the two reports* differ markedly. The Harvard Business School report emphasizes conservation and solar energy as answers to the nation's energy problem, contending that it is nothing short of "romanticism" to imagine that the steady rise of oil imports can be stopped even by extraordinary efforts to develop the four "conventional" domestic energy sources—oil, gas, coal, and nuclear.

The RFF report, on the other hand, emphasizes the need to expand a variety of domestic sources of energy supply, including coal and nuclear, and not rely heavily on unconventional means still a long way from commercial reality. Conservation and solar energy are acknowledged to be important, but the report is notably less bullish than the Harvard study as to what can be expected of them in the near term and is especially cautious as to the solar prospect.

But, on synfuels, authors of the two reports appear to be saying the same thing, or at least thinking in the same vein. Testifying recently before a Senate subcommittee, Mel Horwitch, a member of the team that prepared the Harvard Business School report, said that the proposed crash program "involves serious risks to the nation in a variety of areas: inefficient use of funds, hazards to the environment, and, ironically, a future wholesale disillusionment with the synthetic fuels option as a result of a possible backlash perhaps midway through this effort as it becomes clear that the grandiose promises we hear today will not be met."

At a recent news conference, Harry Perry, RFF's expert on coal and synfuels and a major contributor to the RFF energy study, told reporters that a crash program amounted to "locking yourself in to the lowest cost technology of today." The alternative, which Perry preferred, would be to begin modestly with a program to test a number of different synfuel technologies at commerical scale in order to to find out what the costs really are and determine the environmental impacts and other problems.

One of Perry's colleagues in the RFF study, Milton Russell, in a recent speech at the American Enterprise Institute, described some of the problems associated with a crash program in these terms:

> Synfuels plants are very large enterprises—a 50,000 BPD coal [liquefaction or gasification] plant will cost, at a minimum, over 2 billion dollars and use several times as much coal as the largest electric generating plant. And no one has ever built even one at this scale. And we are talking about building 20 to 30 of them in the next 10 years assuming [that] 1 to 1½ MBPD will come from coal. Another set of plants using essentially the same heavy construction and engineering skills and the same industrial base will be required for the oil shale program. . . . We do not have unemployed managers, skilled laborers, and production equipment to utilize as we did with war production in 1941. The managers, engineers, and laborers will have to be trained or diverted from other activities, [and] new plants will have to be built to produce the equipment going into the synthetic fuels plants. . . . Some of these steps [and others, such as selecting sites and obtaining environmental approvals] can be compressed, but, taken together, the prospects for anything like 2.5 MBPD by 1990 seem to me slim unless as a nation we decide nothing much else is important.

Russell added that, the faster the synfuels program is pushed, the higher will be its costs, and that these will be paid in three ways: first, the cost in direct waste, as the same mistakes are made in a lot of places at once, "when redundant paths are followed because there is no time to learn, and when inevitable unforeseen bottlenecks mean that time and effort is lost everywhere"; second, the cost "in lower output in the rest of the economy as shortages and distortions show up because labor and equipment are diverted to synfuels tasks leaving a mismatch among resources and leading to less efficient production of everything else"; third, the cost in loss of energy production from conventional sources, as money, equipment, labor, and technical skills are diverted from the search for conventional oil and gas and the construction of conventional energy conversion facilities, such as coal-fired electric generating plants.

"This last cost should be carefully examined in evaluating even a 'successful' program," Russell said, observing that, even if the goal of producing oil substitutes at the rate of 2½ million barrels a day should be achieved, oil imports might not be reduced by that amount.

If a big crash program for synfuels development is a bad idea, what level of effort is appropriate? Horwitch of the Harvard Business School recommends a modest effort, perhaps the equivalent of a half-dozen projects rather than the twenty-plus that the Administration has in mind. "We need a portfolio of synthetic fuel activities that range across the spectrum in terms of technological risks, scale, and type of raw material," Horwitch says. He suggests that the program include first, second, and third generation technologies; laboratories; pilot- and demonstration-scale plants; and maybe a commercial plant. "Perhaps by 1990," he says, "we will be producing the oil equivalent of 250,000 to 500,000 barrels per day of synthetic fuels. More importantly, however, our learning in this area will have been accelerated."

Russell of RFF also favors such an "informational" program, except that he emphasizes the importance of building commercial size plants to test "social acceptability, environmental impact, and, in general, the feasibility of operating plants at this scale." Perry believes that, as a practical matter, even with an all-out synfuels effort, the production capacity

**Energy Future*, Report of the Energy Project at the Harvard Business School, edited by Robert Stobaugh and Daniel Yergin, Random House, $12.95; *Energy in America's Future*, a study directed by Sam H. Schurr and published for Resources for the Future by Johns Hopkins University Press, Baltimore, Maryland, $10.95.

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that could be brought on line by 1990 would not exceed 500,000 barrels per day. With an informational program, he says, daily production probably would be no more than half that.

Perry notes that there simply has been no case of a synfuels plant ever having been built before on the scale—50,000 barrels per day or larger—contemplated in President Carter's proposal. Nazi Germany's maximum daily production of synfuels during World War II was, he says, 110,000 barrels, with the largest plant producing 17,000 barrels.

Early this summer, prior to the President's announcement of his proposal, there was a strong push in Congress for a major national synfuels effort. A bill was passed by the House of Representatives to establish, through a program of price and loan guarantees, a 2 MBPD synfuels industry by 1990. Since then, however, an attitude of caution has become evident, especially on the part of the Congressional Budget Office. When Congress returns from its Labor Day recess, the kind of advice now being heard from the Harvard Business School team and RFF may contribute to a reshaping of synfuels strategy.—LUTHER J. CARTER

Dollars for Drug Research Flow Overseas

U.S. firms now sink millions into testing new drugs in Europe, partly because of strict limits on human experimentation at home

During the past decade, U.S. pharmaceutical companies have made a little-noticed but significant shift in where they sink their research dollars. Increasing amounts of money are flowing into Western Europe, especially into France, Switzerland, the United Kingdom, and West Germany. According to the Pharmaceutical Manufacturers Association (PMA), U.S. drug companies in 1970 spent $47.2 million or 8.7 percent of their total R & D budget in foreign countries. By 1978, those figures had climbed to $229.6 million and 16.8 percent. A large part of the money goes into clinical trials, in which clinical pharmacologists in many European countries give experimental drugs to groups of patients and healthy volunteers.

Why these studies are increasingly done abroad and what the U.S. drug giants do with the results of the research are questions currently under much debate. Industry executives say stiff federal regulations have put drug development in this country on the decline. To sidestep the regulations, they move their R & D overseas and then send the results back here.

Federal regulators at the Food and Drug Administration (FDA) say it is not that simple. While admitting that tough new rules are a factor, they also point to the decline of the dollar, to different tax structures in other countries, and to various economic incentives overseas, including the underwriting of research risks by some foreign governments. They also say that much of the research done by U.S. firms overseas is never used in the United States but instead goes for product development in expanding foreign markets.

The debate is diffuse, for there are few hard facts available to support either side's contentions. The pharmaceutical firms are loath to release any information that might tip off a competitor, and the FDA in most cases does not have the economic data to back up its views. Differing opinions are nonetheless significant. They touch on industrial innovation, a hot political topic that is currently the subject of an Administration domestic policy review. They also touch on the so-called drug lag—the alleged delay between marketing new drugs in Western Europe and getting them on pharmacy shelves in the United States. And the debate over pharmaceutical innovation is being closely followed by Senator Edward M. Kennedy (D-Mass.), who recently sponsored legislation that would, among other things, speed up the process of new drug approval.

Some FDA officials are quick to admit the adverse economic impact of their regulations. "The whole overview and federal supervision of research has increased substantially in the past 5 years," Jerome A. Halperin, deputy director of the bureau of drugs, told *Science*. "FDA now has a comprehensive bioresearch monitoring program. We evaluate toxicology laboratories through our 'good laboratory practices' regulations. We've proposed regulations on sponsors and monitors of clinical trials. We've got regulations covering the clinical investigators. We're proposing new regulations on Institutional Review Boards, and on informed consent. . . . It all increases the burden on a drug company doing research in the United States."

Confirming this view is a statistic from the National Science Foundation (NSF). In a study issued last April, NSF noted that the greatest growth in overseas expenditures occurred between 1974 and 1975, when the foreign R & D budgets of U.S. drug companies almost doubled. This, the study noted, was probably in response to a new FDA regulation that was proposed in 1973 and passed in 1975. It said for the first time that FDA would accept test results from studies made in foreign countries.

Many U.S. drug companies say the NSF assertions are correct. Barry M. Bloom, president of central research at Pfizer, which in 1978 put a total of some $113 million into R & D, told *Science* that since 1973 their R & D budget in Europe has grown about four times faster than their domestic R & D budget. Much of it, he said, was in response to the FDA foreign-data regulations. But when asked for specific examples of European data submitted in support of a U.S. drug application, Bloom waxed noncommittal. "There is sort of a time lag," he said. "Whereas in the future I fully expect we are going to have some important cases where the pivotal studies will be European, I can't say that yet." Bloom also concedes that the FDA position on expanding foreign markets is at least in part correct. "Today, the United States only constitutes a quarter of the world's market. Not so many years ago it used to be half. So regardless of whether that foreign R & D expenditure goes back to the U.S., it will certainly contribute to a company's foreign marketing organization."

With some companies, foreign data have already helped pave the way for acceptance of a drug in the United States.

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